

2

Planning

- 2-1** Planning Process Overview
- 2-2** Identifying and Selecting Potential Projects
- 2-3** Establishing Goals and Objectives
- 2-4** Identifying Measurable Outcomes
- 2-5** Conveying Goals, Objectives, and Measurable Outcomes

Wetland restoration efforts in Minnesota should be prioritized to maximize functional benefits that are valued at a watershed, community, or property scale. These functional benefits commonly include; water quality improvement, wildlife habitat improvement, and water quantity management, but may also include any number of other landscape level functions or program requirements used as part of project selection. Fortunately, Minnesota has a variety of wetland restoration programs each with their own program requirements specific goals for restoration.

Careful planning is needed to ensure identified restoration projects and their associated functional benefits are in-line with program goals. Goals, whether narrowly focused on specific functions or more broadly focused based by program or watershed need, will influence the prioritization and selection process of restoration projects. Prioritization helps to narrow and select potential restoration sites based on their ability to positively affect identified functional benefits.



Figure 2.1

This section of the Minnesota Wetland Restoration Guide discusses the initial steps in planning, identifying, and prioritizing wetland restoration sites. It includes discussion of available programs and restoration opportunities and then considerations for identifying and establishing appropriate project goals, restoration objectives, and measurable outcomes.



2-1 Planning Process Overview

Restoring wetland ecosystems is often a complex process that can take several years to complete and then many more years to evaluate restoration success. Determining what makes a restoration successful can be complicated and highly variable depending on individual perspectives and a project's purpose. Defining the purpose of a planned wetland restoration is generally accomplished by defining goals and objectives that are realistic, practical, and appropriate for a given site.

The restoration of drained and altered wetlands requires that a number of technical and ecological disciplines be involved in the planning, design, and

implementation phases of a project. This requires a coordinated vision throughout the restoration project that all starts will proper project planning.

This chapter discusses the following topics related to project planning.

- **Planning Process Overview**
- **Defining General Need or Purpose**
- **Conservation Programs**
- **Regulatory Programs**



Figure 2.2 *Wetland mitigation project*



Figure 2.3

Planning Process Overview

A critical element in the planning of any wetland restoration is the ability to assess restoration potential and then to translate project opportunities into a defined set of goals, objectives, and outcomes.

Good planning serves as a guide throughout the entire restoration process for making decisions and taking action. Not every project requires all of the planning steps identified in the Guide, nor will the steps be the same for every project. The project's purpose, size, complexity, and expected outcomes can all affect the extent of planning that will be necessary. A project might involve several landowners, could include multiple wetlands to be restored, or could require a rigorous permitting or approval process, each with its own set of challenges and needs. In contrast, relatively simple projects might allow a streamlined planning process. Proper planning appropriate for the scope of the project will ultimately limit costly surprises and could reveal unexpected opportunities.

An overview of the recommended planning process to be used when restoring drained and altered wetlands is provided in **Figure 2-4**.

Planning Process Overview

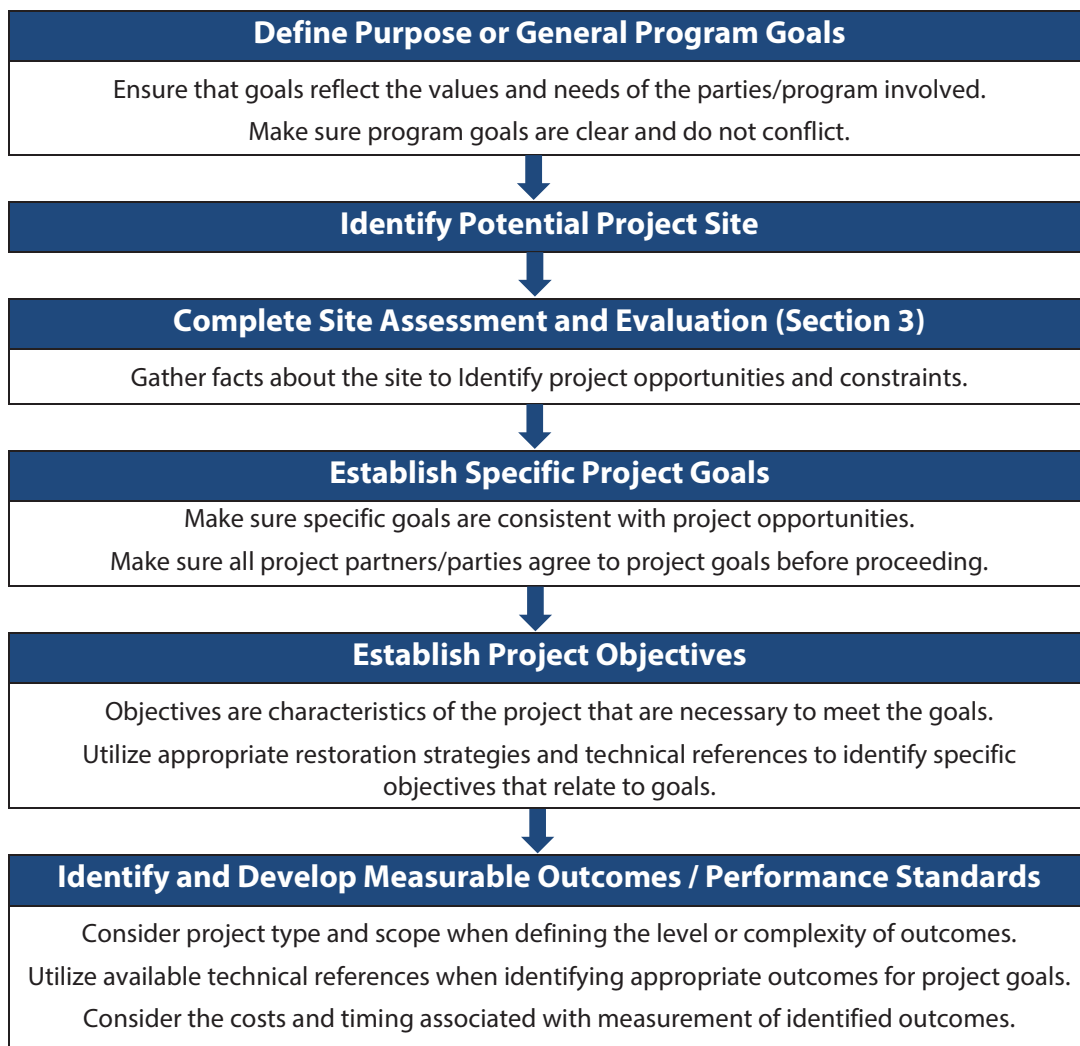


Figure 2.4 *Planning Process Overview*



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Defining General Need or Purpose

Although need or purpose can be defined by an individual owner, it is more likely to be defined by a governmental unit, organization, group, or a specific conservation or regulatory program. In Minnesota, there are many opportunities available through local, state, and federal units of government as well as through conservation organizations to restore wetlands on both private and public lands.

Wetland restoration on private lands can occur through a number of available conservation programs that provide financial compensation, incentives, technical assistance, and resources to complete the work. This work usually occurs through purchase of easements or entering into some form of agreement or contract. Private lands work is also conducted by landowners wishing to improve their properties outside of available programs or as a result of wetland regulatory efforts to address a specific wetland replacement or mitigation need.

Wetland restoration work that occurs on public lands can involve land purchases for establishment of wildlife and waterfowl management areas or refuges, wetland replacement for regulatory purposes of public entities, and implementation of local natural resource plans.

Whether potential projects are planned for conservation, private, or regulatory purposes setting goals helps develop a vision for the project. Program goals that are fairly general reflect needs, expectations, or requirements, and focus on the more popular and beneficial wetland functions such as improved habitat, water quality, and flood control. A more specific program goal would be the replacement or establishment of certain identified wetland functions and values. Regardless of their specificity, program goals need to be clearly understood before evaluating potential project sites. The early identification of general program goals facilitates the development of more specific goals and objectives and, ideally, will influence design and implementation strategies upon project selection.



Figure 2.5 *Wetland Reserve Program restoration project in Kanabec County*



Figure 2.6

Conservation Programs

There are many conservation programs and opportunities available for which wetland restoration work occurs in the state. They all differ in their purpose, enrollment, and acquisition procedures, eligibility criteria, policies, standards, approach to restoration, maintenance requirements, acceptable uses, and management goals. These programs offer financial and technical assistance to private landowners for restoring wetlands and adjoining upland habitats. They are available through federal and state government agencies as well as local units of government and private conservation organi-

zations. Through these programs, landowners have the option of selling their land or they may retain ownership while accomplishing restoration through conservation easements or short-term agreements or contracts. The availability of a specific conservation program varies and it is often dependent on available funding. Most of these programs have a defined purpose or need that is the starting point for identifying projects, conducting site assessments, and refining goals and objectives.



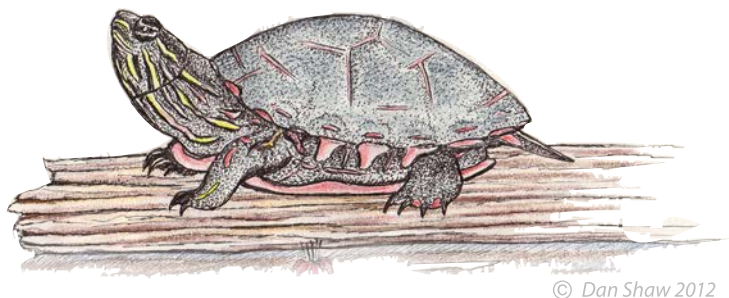
Figure 2.7 *Wetland mitigation project in Washington County*

Regulatory Programs

In Minnesota, local, state, and federal wetland laws and regulatory programs provide protection for wetlands. In certain situations, impacts to wetlands must be mitigated through the replacement of lost wetland functions and values. The requirements and details of each of these regulatory programs vary and will not be discussed here except in general terms.

The Minnesota Wetland Conservation Act (WCA) regulates most wetland activities in the State and has specific wetland replacement requirements. The U.S. Army Corps of Engineers under Section 404 of the Federal Clean Water Act also requires wetland replacement for activities that impact certain wetlands. The Natural Resource Conservation Service (NRCS) has wetland replacement requirements that affect Federal Farm Program participants. In addition, individual cities, counties, watershed districts, or watershed management organizations may have specific mitigation requirements for wetland impacts within their jurisdictions.

Different regulatory programs have different requirements for replacement.



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2-2 Identifying and Selecting Potential Projects

The identification and selection process for most wetland projects will be driven by the general need as discussed in the previous chapter. Landowner-initiated projects may be located on lands not considered high-priority by government programs. In contrast, government program managers tend to seek projects that will achieve an identified need, often seeking multiple sites and project types within a targeted area or watershed. The selection of potential projects for program funding can become difficult as program goals often need to be weighed against landowner desires. Having a clearly defined strategy or scoring system for prioritizing potential projects can help to address some of these potential issues.

The rationale behind initial project identification also influences much of the project planning, including the later establishment of more specific project goals, objectives, and measurable outcomes. This chapter discusses the following in relation to initial project identification:

- **Statewide Wetland Restoration Strategy**
- **Landowner Initiated Projects**
- **Identifying Project Sites to Meet Specific Goals**



Figure 2.8

Statewide Wetland Restoration Strategy

A statewide Wetland Restoration Strategy developed in January 2009, provides the framework for a coordinated approach to the restoration of drained and degraded wetlands.

This strategy emphasizes targeted public funding to restore sites that provide the greatest environmental benefits at a landscape, watershed, or flyway scale. It also recognizes the desire of many private landowners to restore wetlands for the site-scale benefits they provide regardless of whether they are or are not considered high-priority by government programs. Key elements of this statewide wetlands restoration strategy are:

- Prioritize restorations based on desired outcomes, specifically water quality improvements, habitat, flood damage reduction, and other hydrologic benefits.
- Improve coordination of wetland restoration efforts.
- Design and produce better wetland restorations that stand the test of time and provide lasting functional benefits.

The stated goal of the strategy is to restore wetlands with functional benefits to watersheds and communities for the benefit of Minnesota citizens.

The strategy discusses identifying potential wetland restoration sites and methods of prioritizing projects based on their ability to effect primary benefits including:

- Water quality improvement
- Wildlife habitat improvement
- Water quantity management (e.g. flood water retention)

This statewide strategy provides a general framework for identifying and selecting potential wetland restoration projects in Minnesota.

Landowner-Initiated Projects

Private landowners can have a variety of motivations for a project: financial, conservation, or simply for aesthetic reasons. Landowners may offer all or a portion of their property through various conservation programs either through their own initiative or after being contacted by representatives, programs, agencies, or other organizations.

Matching the needs of the landowner with the opportunities that exist on the property is a vital function of the planning process. If the project is to be completed through a conservation program or because of a regulatory requirement, program policies, goals, and site criteria must be consistent with landowner needs and the opportunities that exist on their property.



Figure 2.9 *Restoration in Winona County*

Identifying Project Sites to Meet Specific Goals

Wetlands present a wide array of functions that provide natural resource benefits when they are restored. Conservation organizations and government entities target projects to achieve specific natural resource goals. These goals may include improving habitat for specific wildlife species, increasing biological diversity, plant community reconstruction, water quality improvement, and flood damage reduction. Goals may also include specific replacement of wetland functions that are lost as part of improvements to public infrastructure such as roads. Once goals are established, sites and projects capable of meeting them are investigated. Various methods are used to identify potential project sites. Some agencies and organizations conduct an extensive inventory and assessment of potential sites using map reviews and Geographic Information Systems (GIS) data. Others identify project criteria and solicit landowner participation via public announcements and workshops.

For regulatory purposes, the restoration of wetlands may be a permit requirement that motivates private companies or individuals to seek out landowners and sites to conduct restoration projects. These type of projects need to meet certain well-defined regulatory requirements.

Once a group of potential project sites are identified, it is important to prioritize projects that best meet pre-defined conservation or regulatory goals. A number of potential project sites may be evaluated and screened before finding one that best fits the defined criteria. Project goals may need to be revised to reflect constraints of a particular project if no other sites can be located that more closely match the original purpose.

2-3 Establishing Goals and Objectives

Establishing goals and objectives influences strategies used for design, implementation and future management of a project. Goals and objectives must be tailored specifically to each site. This requires an assessment of the project site as discussed in **Section 3** of the Guide. Since general goals are defined for a project before performing a site assessment, they will need to be re-evaluated and, potentially, adjusted based on the assessment results. The reiterative process identifies project opportunities, limits, and constraints and results in more clearly defined project goals and objectives.

This chapter discusses development of specific goals and objectives, how the type and scope of a project influences decisions, and provides insights on how different project situations influence goals and objectives.

- **Definitions of Goals and Objectives**
- **Considerations for Establishing Goals and Objectives**
 - *Restoring to Historic Conditions*
 - *Considerations for Project Scope*
 - *Dealing with Multiple or Conflicting Goals*
 - *Planning for Function Based Goals*



Figure 2.10 Restoration project with high species diversity in Renville County

Definitions of Goals and Objectives

Goals are statements or conditions that reflect the desired outcomes or future condition of a project. They equate to the project purpose. In many instances, goals are broad and cannot be directly measured. For wetland restoration and creation projects, goals will tend to focus on those unique functions that wetlands and their associated buffers provide: habitat for certain wildlife species, water quality protection, floodwater storage, etc. Goals represent the ideal outcome for a project and might require modification as more realistic project opportunities or limitations are identified as the project progresses.

Objectives are more specific than goals and describe specific actions that must be completed to achieve and support the identified goals. Objectives are measurable or readily apparent when they are completed. For example, an objective of establishing native vegetation on a restored wetland is something that can be readily observed and measured. This objective may be part of an overall goal of increasing wildlife habitat diversity.

Objectives are formulated based on the results of the site assessment and evaluation process. Objectives must support and directly relate to the project's ability to achieve the goals that are established for it. For example, if the goal of the project is to "restore a tile-drained prairie pothole wetland to provide suitable waterfowl habitat", the following supporting project objectives might be appropriate:

- Remove sediment from the wetland basin.
- Break or block the tile system.
- Establish a diverse mix of shallow marsh and open water plant communities.
- Establish diverse native plant communities on the surrounding upland buffer.

Regardless of the goals established for a particular project, the associated objectives should be based on valid data and technical resources that equate the objective to the functional goal.

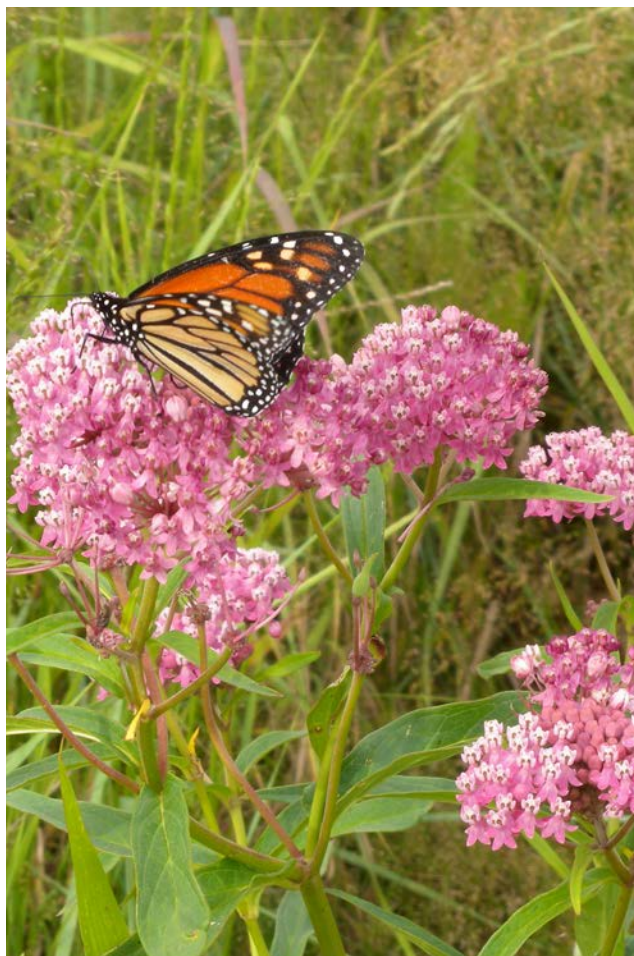


Figure 2.11 *Monarch on marsh milkweed*

Considerations for Establishing Goals and Objectives

The development of project-specific success criteria follows the identification of general goals and the site assessment and evaluation process. In addition to being realistic and achievable, success criteria should be consistent with the requirements of programs, agencies, or organizations that are sponsoring the work. As stated earlier, the establishment of goals and objectives usually occurs after a comprehensive assessment of a project. The following are some considerations for establishing specific project success criteria:

Restoring to Historic Conditions

Restoring a wetland to historic conditions (sometimes referred to as “pre-settlement conditions”) is an idealized goal that is typically assumed to be the best possible outcome for a restoration project. The assumption is that these historic settings reflect a more self-sustaining wetland that functions naturally within the landscape. In some situations, surrounding land use changes and other factors may make this goal unrealistic or not the best choice for the current site condition. If adjacent land uses and drainage patterns have been significantly altered, this may prevent wetlands from being restored to their true historic condition. In addition, the introduction of sediment and irreversible changes to soil structure, characteristics, and microbial functions of wetland soils resulting from years of intensive drainage, tillage, and application of herbicides and pesticides may prevent a true and complete restoration to historic conditions.

In these cases a more achievable goal might be to restore these sites to a condition more suited for the

current situation. A simple goal might be to restore a functioning, self-sustaining wetland. Project proposers may identify certain aspects of the project that can be restored to historic conditions while establishing other goals that may not emulate historic conditions but will be achievable in the context of an altered landscape. It will be important then to assess whether or not historic conditions can be fully achieved before establishing it as a goal. There may be other attainable goals that do not emulate historic conditions but would more effectively address program objectives.

It is often a goal for conservation organizations and government entities to restore wetland complexes as it may be easier to restore wetlands to historic conditions if they are part of a larger, connected wetland system. Wetland complexes are also desirable as they tend to have wetlands of different water depths that provide resiliency to climate variation, provide deeper overwintering areas for amphibians and water levels that support a wide range of migratory birds.



Figure 2.12 *Giant bur-reed establishing from seedbank in a restored shallow marsh*



Figure 2.13 *Project in Soybeans prior to restoration*

Considerations for Project Scope

Scope is defined as a project’s purpose, size, and complexity necessary to achieve success. A limited-scope project may contain just a few small drained depressional wetland basins, whereas a large-scope project may encompass numerous drained and altered wetlands, all of varying types and sizes. Scope also ranges in complexity from restoring a simple, ditch-drained wetland basin to a tile-drained landscape that has multiple landowners and a network of subsurface drainage tile.

Developing goals and objectives for limited-scope projects is often fairly straight forward, as only a few options will usually exist for how the project can be completed. Developing goals for large-scope projects requires both a broad perspective on how the project fits into the larger landscape as well as a focus on the unique objectives for each wetland to be restored. On a project involving restoration of multiple wetlands, there may be a set of broader goals and objectives for the project as a whole and several sets of specific criteria focused on individual wetlands.

Dealing with Multiple or Conflicting Goals

The project proposer and individuals and organizations involved in a project must identify the particular functions that they value and the outcomes they expect. This can lead to exploring multiple goals, some of which might conflict with each other or be unattainable



Figure 2.14

for a specific site. For example, a restoration project may be initiated through a program with a high value on flood control via increased flood storage. In contrast, the landowner may value the project's potential for providing high-quality waterfowl habitat. In this case, maximizing flood storage may conflict with providing high quality waterfowl habitat. These conflicting values must be identified, discussed, and incorporated into the establishment of goals for the project. If a site cannot accommodate maximum benefits for all stated project goals, compromises may be needed. In the preceding example, the goals may have to be adjusted to provide a lower amount of flood storage and a more moderate level of waterfowl habitat. The process of setting explicit goals can be an effective way to illuminate and deal with multiple or conflicting goals.

Planning for Function-Based Goals

Goals often relate to unique functions that wetlands provide: flood storage, wildlife habitat, water quality protection, shoreline protection. Many resources can help identify and characterize functions of Minnesota's wetlands, MnRAM (Minnesota Routine Assessment Method) is a common reference document that can be used to identify wetland functions and the elements that influence these functions. Other resources include Hydrogeomorphic Assessment Method (HGM) functional assessment guidebooks and numerous other methodologies developed by other States. The type of information used in these functional assessment methodologies for a given function (i.e. the input parameters) can help determine if desired functional goals are feasible for a particular site.



Figure 2.15

Some key considerations for planning specific wetland functions are summarized below. It is important to consider what opportunities sites can provide within watersheds and how wetland functions can be maximized.

Planning Considerations for Wildlife Habitat

- Restoring wetland complexes when possible to restore a variety of water depths and wetland types
- Connecting habitat corridors
- Considering landscape stressors such as water fluctuations, sedimentation and invasive species that may detract from wildlife goals
- Conducting restoration in areas targeted for specific wildlife species
- Restoring habitat for a wide range of wildlife types including rare and declining species
- Decreasing landscape fragmentation and edge effect
- Providing sufficient nesting habitat
- Restoring self-sustaining natural systems
- Considering future management that may be needed to maintain wildlife goals

Planning Considerations for Water Quality

- Defining target pollutants
- Selecting restoration sites where they can most effectively treat target pollutants
- Investigating what restoration methods are most effective for treating target pollutants
- Planning plant communities that can handle planned site conditions and pollutant removal
- Considering future management that may be needed to maintain water quality benefits

Planning Considerations for Flood Retention

- Selecting restoration sites where flood retention is a priority for restoration projects
- Selecting restoration sites with the greatest flood storage potential and downstream benefits
- Selecting restoration sites where flood retention and water fluctuations will not negatively detract from plant community and wildlife goals
- Planning plant communities that can help catch and slow water flows
- Considering future management that may be needed to maintain flood retention benefits



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2-4 Identifying Measurable Outcomes

One of the more difficult aspects of project planning is identifying and articulating outcomes in ways that are useful, meaningful, and measurable. Outcomes can be simply defined as the measurable results or attributes of project objectives. Specific outcomes should only be defined if there is a plan to quantify and monitor them after the project is restored.

Conservation projects may not be required to have specific written project outcomes; however, establishing some defined outcomes will serve as a useful measure of project success. Without a set of well-defined outcomes, the determination of whether or not project goals and objectives have been met is subjective. Projects associated with wetland regulatory programs are likely to require documentation of specific outcomes that can be verified through measurement and moni-

toring. This is required to support the need to replace lost wetland functions by these regulatory projects. In the wetland regulatory setting, outcomes are often referred to as “performance standards.”

Outcomes can be related to short, intermediate, or long-term conditions depending on project goals and monitoring period length. Short-term outcomes, such as observing a hydrologic event after completion of a restoration, are often simple and easy to document. Long-term outcomes, such as establishment of a certain minimum number of native, noninvasive species as dominants in restored wetland areas, may require intense sampling and extensive documentation.

Table 2-1 shows examples of outcomes as they relate to project goals and objectives.



Figure 2.16

Table 2.1 Examples of goals, objectives, and associated outcomes

Goal	Objective(s)	Outcome(s)
Provide high quality wildlife habitat and plant diversity	<ul style="list-style-type: none"> ■ High interspersions of plant community types achieved by implementing a diverse seeding and management plan ■ Selective shallow scraping to remove sediment and create deeper water regimes 	<ul style="list-style-type: none"> ■ At least 3 different plant community types composed of 12 or more native plant species ■ Scraped areas with normal water depths from 0.5 to 2.5 feet during the growing season ■ At least 3 nesting pair of waterfowl utilize the site each year
Improve flood conditions in downstream lake by attenuating floodwater	<ul style="list-style-type: none"> ■ Establish dense upland and wetland vegetation to slow and intercept flood waters 	<ul style="list-style-type: none"> ■ At least 90% areal coverage of vegetation and at least 30% coverage by shrubs and trees
Restore seasonally flooded wet meadow	<ul style="list-style-type: none"> ■ Break drainage tile to restore natural hydrology ■ Establish diverse native vegetation in wetland and upland project areas 	<ul style="list-style-type: none"> ■ Surface water present in 50% of the basin for at least 14 consecutive days from May until June ■ At least 8 or more dominant native plant species in upland and wetland plant communities
Provide breeding habitat for amphibians	<ul style="list-style-type: none"> ■ Construct earthen embankment across drainage ditch and install water control structure 	<ul style="list-style-type: none"> ■ At least 6 inches of surface water in 50% of the basin until June 1

When developing measurable outcomes, consider who will conduct the measurements, when and how often measurement will occur, how results will be documented and used, who will be reviewing the results, and how the outcomes reflect the project goals. It is particularly important that outcomes be based on specific characteristics that indicate if a functional goal and objective has been met.

As previously mentioned, MnRAM and HGM identify specific wetland and landscape functional indicators. These and other evaluation tools provide a basis for establishing measurable outcomes that equate to the chosen functional goals and objectives. For example, the vegetative diversity/integrity function in MnRAM provides specific threshold values for percent coverage of invasive and exotic plant species as well as the number of native plant species present. These are used to determine the relative quality of a given plant community (high, medium, low). Threshold values, such as "<20% coverage by invasive/exotic plant species," can be used to establish a measurable project outcome. Although such performance standards can be established without an associated technical reference, supporting them with scientific data or science-based materials reduces the chance they could be viewed as subjective and arbitrary.

Consider the time and expense related to measurement when establishing outcomes. Some outcomes may require costly monitoring protocols and the services of highly-specialized scientists or ecologists. The monitoring protocol associated with a particular measurable outcome should be within the project scope and budget. For example, if a project objective is to provide infiltration to meet the goal of groundwater recharge, the actual measurement of water infiltration through the soil both before and after completion of the project will be necessary. This requires specialized equipment (infiltrameter) and is labor-intensive for a significant period of time.

2-5

Conveying Goals, Objectives, and Measurable Outcomes

One of the many challenging aspects of establishing goals and objectives is finding a reasonable method to clearly convey them to others involved in reviewing or implementing the project. Reporting methods might be dictated by the purpose for which a project is being completed. At the simplest level, a wetland restoration project being completed through a conservation program may convey the information through the development of plans and drawings. For larger and more complicated projects, correspondence, concept plans, preliminary reports, and other documentation may be needed in addition to the final

plans and drawings. Plans and reports should discuss explicitly the goals of the project, the specific means to accomplish those goals, and the expected outcomes to be achieved. Finally, regulatory and other select projects may need to go a step further in documentation and include comprehensive reports. These reports may detail monitoring plans and document the coordination with regulatory personnel (formal approval letters, etc.) Other submittals would describe not just what will be accomplished but also how, when, and by whom the work will occur, and how the outcomes will be measured and verified.



Figure 2.17 *Wetland restoration in Beltrami County*

